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SHORT REPORT

Combined Simultaneous Basilic and Brachial Vein Transposition. A New Technique to Create an Autologous Vascular Access

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Abstract In this report, we present a technique to extend the function of an antecubital arteriovenous fistula in which both the basilic and the brachial veins were simultaneously transposed to create an autologous graft in the arm. This procedure may particularly be applicable for patients in whom, although a brachio-cephalic fistula, anastomosing the brachial artery and the perforating antecubital vein, has been previously performed and has remained patent arterialising the deep arm veins, the cephalic vein has failed to mature or has been thrombosed after multiple punctures. Our preliminary experience in eight patients has shown satisfactory outcome.

The authors propose a modification of the delayed basilic transposition, described by Kapala *et al.*,[1] to extend the function of a brachio-cephalic fistula with an anastomosis between the brachial artery and the perforating antecubital vein (BCF—BPAV).

This technique can be used in cases where although a BCF—BPAV is not accessible, because the cephalic vein has either failed to mature or been thrombosed but the anastomosis has remained patent, arterialising the basilic and brachial veins through the communicating tributaries that are preserved between these veins along the antecubital fossa and arm.

Technique

Patients were preoperatively examined with colour duplex imaging (CDI) to evaluate both the arterial and venous arm circulation. The patients gave written consent to be subjected to this procedure.

The procedure is performed using tumescent anaesthesia (1 l NaCl 0.9%, 36 ml lidocaine 2%, 1 ml adrenaline 1%, 10 ml sodium bicarbonate 8%) with the arm abducted. Both the arterialised basilic and brachial veins are exposed and mobilised through a longitudinal incision that starts 2—3 cm above the antecubital fossa extending along the

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medial bicipital furrow (Fig. 1). A second incision is subsequently made 2—3 cm above the previous incision following the aforementioned course up to the axilla, preserving a short skin bridge between the two incisions (Fig. 1), through which mobilisation of the arterialised veins up to the axilla is achieved. All their tributaries are ligated.

The brachial vein is divided close to the antecubital fossa. A third, small incision is performed in the middle of the anterior—lateral aspect of the arm through which the brachial vein is subcutaneously placed (upper half graft) using a tunnelling device (Fig. 1A). After the vein has been placed in the tunnel, its cut end is clamped and a second clamp is positioned at the axillary vein, proximally to the basilic—brachial junction causing the collapsed brachial vein to fill with arterialised back-flow through its junction with the basilic vein. This manoeuvre dilates the vein, correcting any kinking or twisting possibly occurring during tunnelling.

Later, the basilic vein is divided close to the axilla and a second subcutaneous tract is opened over the anterior and lateral aspects of the lower half of the arm, through which the basilic vein is tunnelled (Fig. 1B). Once more, after the transposed vein has been placed in the tunnel, its distal end is clamped to dilate the vein with blood at arterial pressure (through the previous BCF—BPAV). Thus, any possible kinking or torsion is again corrected. Both venous segments are flushed and heparinised. An end-to-end anastomosis is fashioned with a 6/0 polypropylene suture.

In this manner, an extended autologous arterio-venous graft (AAVG) is created over the anterior—lateral aspect of the arm; doubling the length of the access compared with that achieved with an isolated transposition of the basilic vein (Fig. 2).

Patients

Between February 2007 and May 2009, eight patients (mean age: 65.9, range: 57—83), four males and four females, underwent combined simultaneous basilic and brachial vein transposition by the technique described. All these had previously undergone a BCF—BPAV creation, which, although functional, was not accessible. In particular, in three of these the cephalic vein had failed to mature, while in the remaining five it gradually thrombosed. However, CDI showed that both the basilic and one of the brachial veins had arterialised blood flow, coming from the BCF—BPAV, as well as significant lumen enlargement.

Results

After surgery, all the patients successfully used their new haemodialysis access after complete healing of the operative wound (15 days). Postoperatively, one patient developed thrombosis of the AAVG after 16 months and other one died after 8 months due to myocardial infarction, having a well-functioning fistula. Thus, during a mean follow-up of 11.3 months (range from 4 to 18 months), both clinically

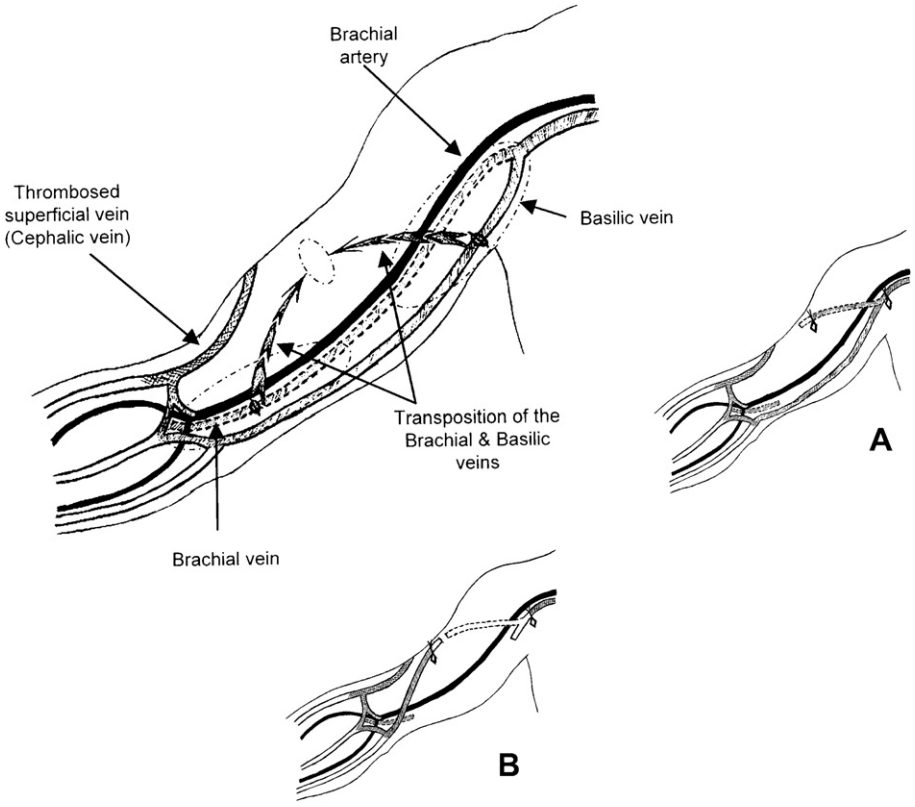

Figure 1 The principle behind this technique is to superficially transpose the arterialised brachial (1A) and basilic (1B) along the anterior—lateral aspect of the arm. Dotted lines represent the incisions.

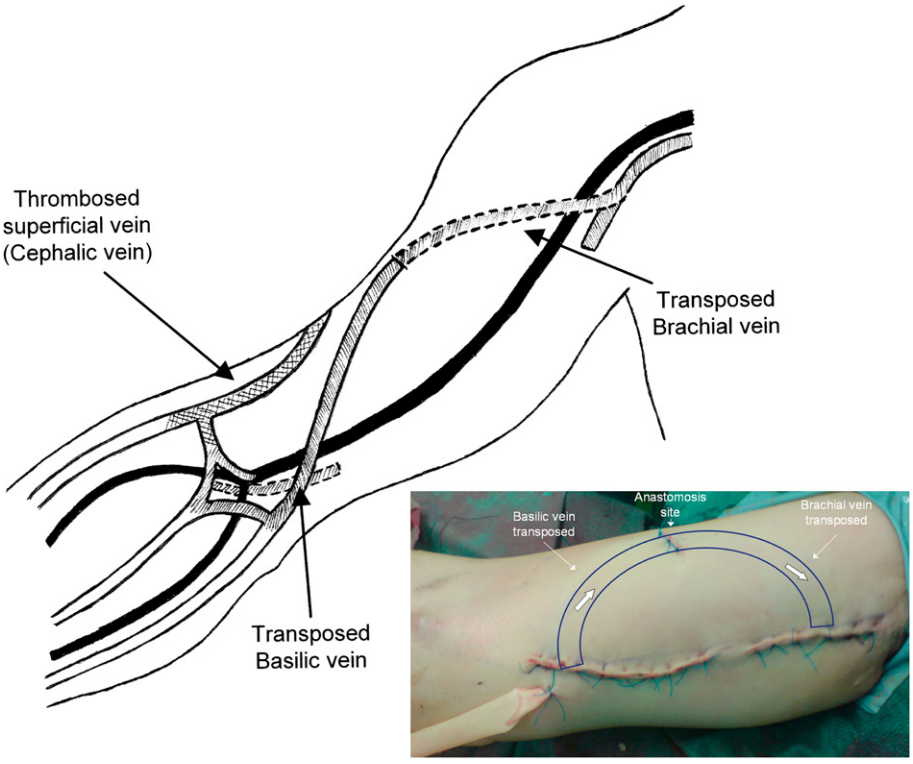

Figure 2 By anastomosing the cut ends of the transposed veins an extended, subcutaneous vein graft is created over the anterior—lateral aspect of the arm; this actually is double in length compared with that of an isolated transposition of the basilic vein.

and with ultrasonography performed, a patency rate of 88% was estimated. Transient swelling of the AAVG-bearing limb was observed in two patients, which gradually regressed within 2 weeks with armrest and elevation. No other post-operative complications were observed.

Comments

Our main objective in developing this technique was to salvage a BCF—BPAV fistula with a working anastomosis but without accessible outflow vessels (either because of failure to mature or due to thrombosis), by using an adequately arterialised basilic and brachial vein, that can be used for dialysis. In addition, this modification provides: (1) prevention from intra-operative axial kinking or torsion and (2) the subcutaneous placement and the increased length of the AAVG along the anterior—lateral aspect of the arm. Thus, we achieved an adequate AAVG initial success rates as well as the avoidance of puncture-related injuries of median nerve and brachial artery. Finally, this technique may have a more general application in simply increasing the length of a basilic vein, which would facilitate a longer and more laterally situated transposition during routine basilic vein transposition.

Conflict of Interest/Funding

None

Reference

1 Kapala A, Szmytkowski J, Stankiewicz W, Dabrowiecki S. A modified technique of delayed basilica transposition-initial results. *Eur J Vasc Endovasc Surg* 2006;**32**:316—7.